# OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **SHELLCAMP POND** the program coordinators recommend the following actions.

Welcome to the New Hampshire Volunteer Lake Assessment Program! As you continue your participation in VLAP the database you create for your water body will help you track trends in lake quality and identify potential problems. As a rule of thumb, try to sample once per month during the summer. Other special sampling programs include monitoring for non-point sources of pollution to the lake, and more frequent, long-term sample collection to establish a complex data set of your lake's water quality. We understand that future sampling will depend upon volunteer availability, water monitoring goals, and funding. **Trend analysis is not feasible with only a few data points.** It can take a few years of data collection to obtain an adequate set of baseline data. Frequent and consistent sampling will ensure useful data for future analyses. Contact the VLAP Coordinator this spring to schedule our annual lake visit. If your group feels they need a refresher in sampling techniques, call us early to make an appointment. Please consult the Interpreting Data and Monitoring Parameters sections of this report when trying to understand data.

## FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The current year data (the top graph) show in-lake chlorophyll-a concentrations are below the New Hampshire mean. The pond showed a slight increase from the 1991 data (lower graph), but it was not a significant increase. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows in-lake transparency is less than the state mean. The pond is fairly shallow (the maximum depth measured in May was 3.5 meters) so this year's reading shows that lake clarity is nearly 2/3 of the water column. In fact, there was an increase from the 1991 data. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show in-lake phosphorus levels are *high* (above the state median), with concentrations in both layers relatively similar to the 1991 data. There may be an external source of phosphorus that is causing the high levels and we hope to reduce these levels in the future. Please consider sampling more frequently next year so we can better understand the lake quality trends. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

## OTHER COMMENTS

- As part of the state's lake trophic classification program, DES biologists performed a comprehensive lake survey on Shellcamp Pond. All public lakes in the state are surveyed every ten to fifteen years. In addition to the tests normally carried out by VLAP, biologists tested for common metals and nitrogen, created a map of the bottom contours of the lake (bathymetry), and mapped the abundance and distribution of aquatic plants along the shores. For a complete copy of the raw data from the survey, please contact the DES Biology Section at (603) 271-2963. A final report should be available in 2002.

- An employee of the NHDES offered to help sample Shellcamp Pond in the future. Please contact us for her name and phone number if you are interested in a little extra help next summer!

- The conductivity result from the Inlet was very high this year (Table 6). High conductivity values often indicate the influence of human activities on surface waters. Septic system leachate, agricultural runoff, iron deposits, and road runoff can all influence conductivity. It would be useful to uncover the reasons for increased conductivity as we continue to monitor the lake.

- The dissolved oxygen concentration was good throughout the water column (Table 9). Shallow ponds tend to mix continuously by wind and wave action, thereby allowing for oxygen exchange with the atmosphere.

- *E. coli* originates in the intestines of warm-blooded animals (including humans) and is an indicator of associated and potentially harmful pathogens. Bacteria concentrations were low at the site tested (Table 12). If residents are concerned about septic system impacts, testing when the water table is high or after rains is best. Please consult the Other Monitoring Parameters section of the report for the current standards for *E. coli* in surface waters.

## NOTES

- Monitor's Note (6/30/00): Did not sample the in-lake station due to impending thunderstorms.

## USEFUL RESOURCES

*Effects of Phosphorus on New Hampshire's Lakes*, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

*Vegetated Phosphorus Buffer Strips*, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

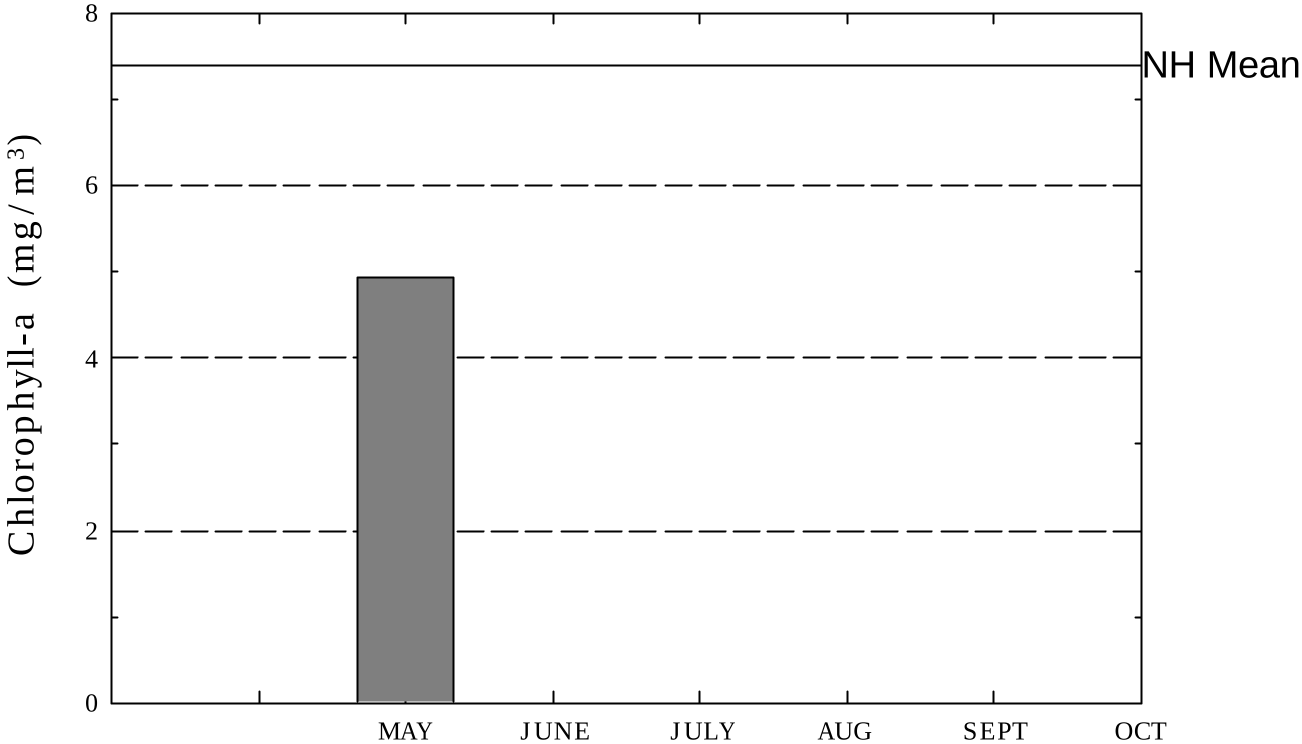
*What is a Watershed?*, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

*Road Salt and Water Quality, WD-WSQB-7*, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

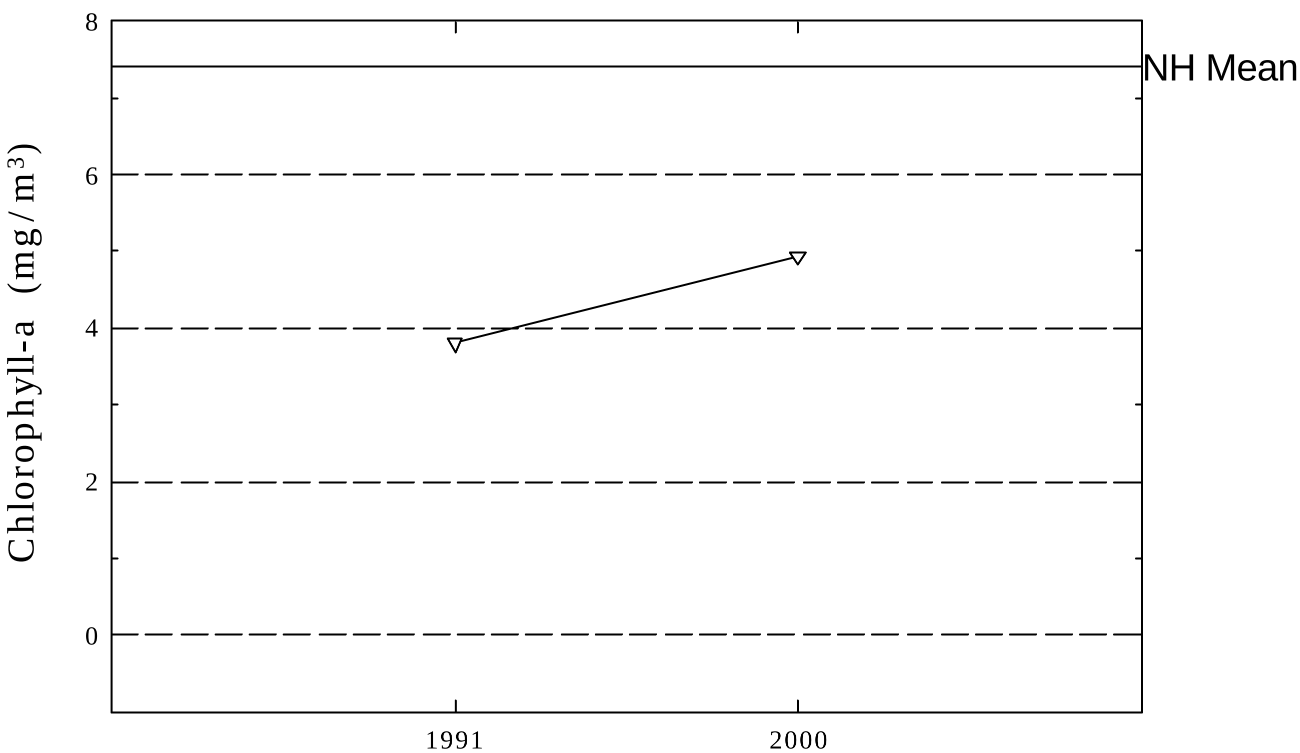
*Sand Dumping - Beach Construction, WD-BB-15*, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

# Shellcamp Pond

**Figure 1.** Monthly and Historical Chlorophyll-a Results



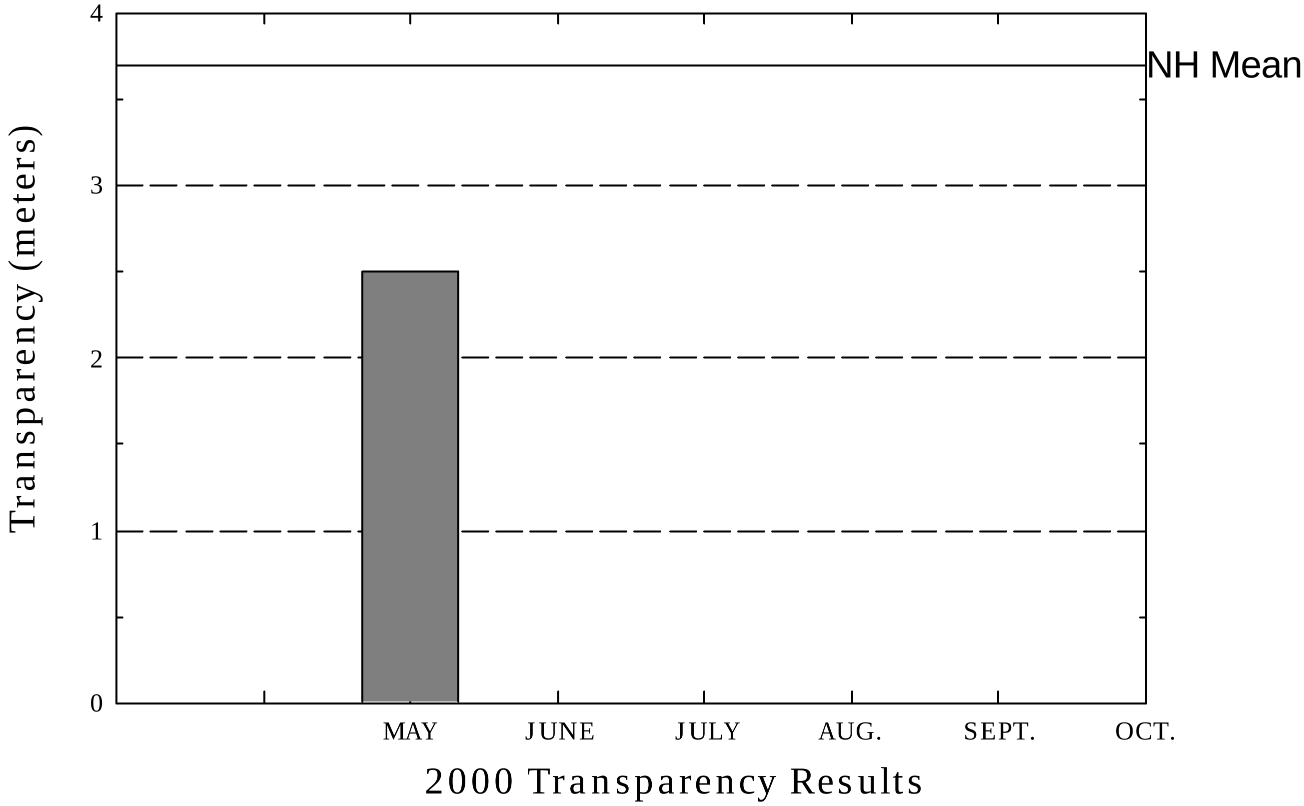

2000 Chlorophyll-a Results

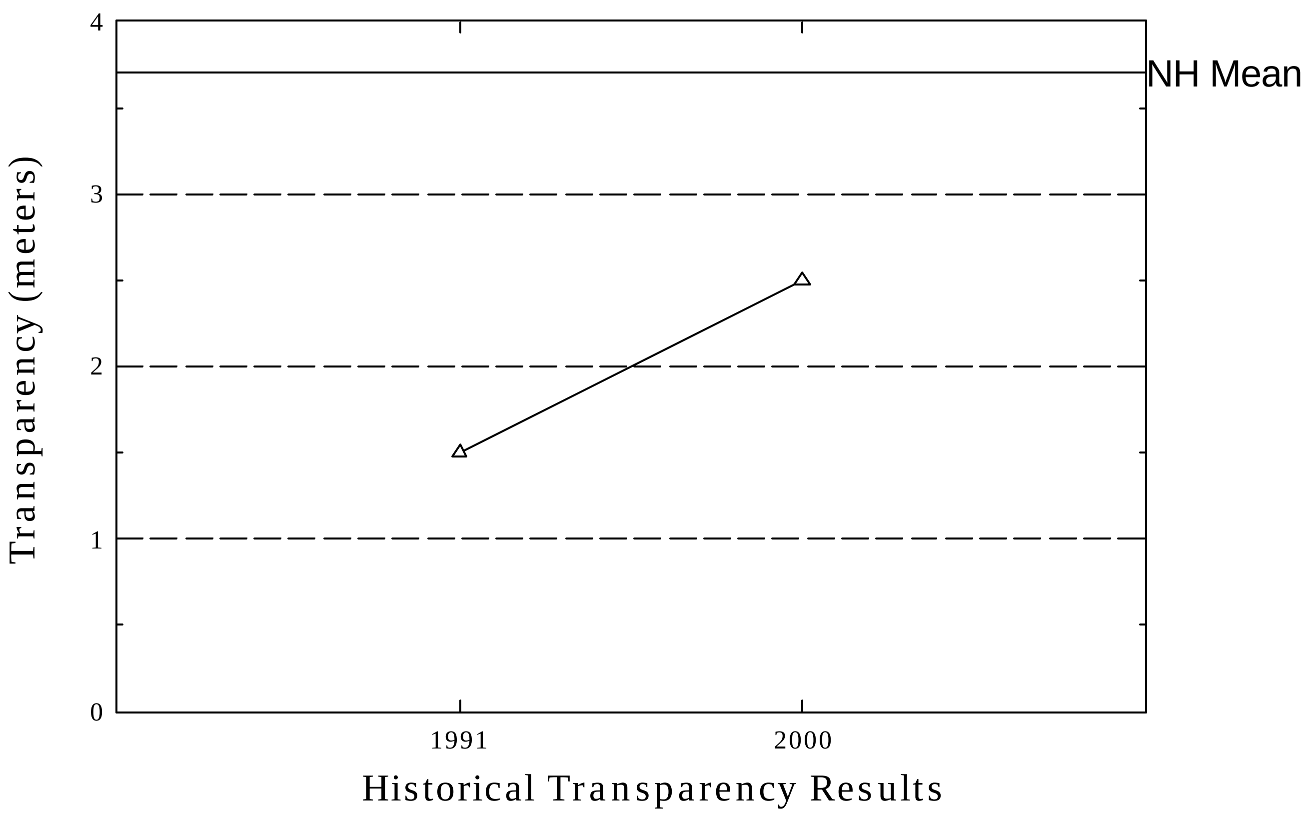



Historical Chlorophyll-a Results

# Shellcamp Pond

**Figure 2.** Monthly and Historical Transparency Results



# Shellcamp Pond

**Figure 3.** Monthly and Historical Total Phosphorus Data.

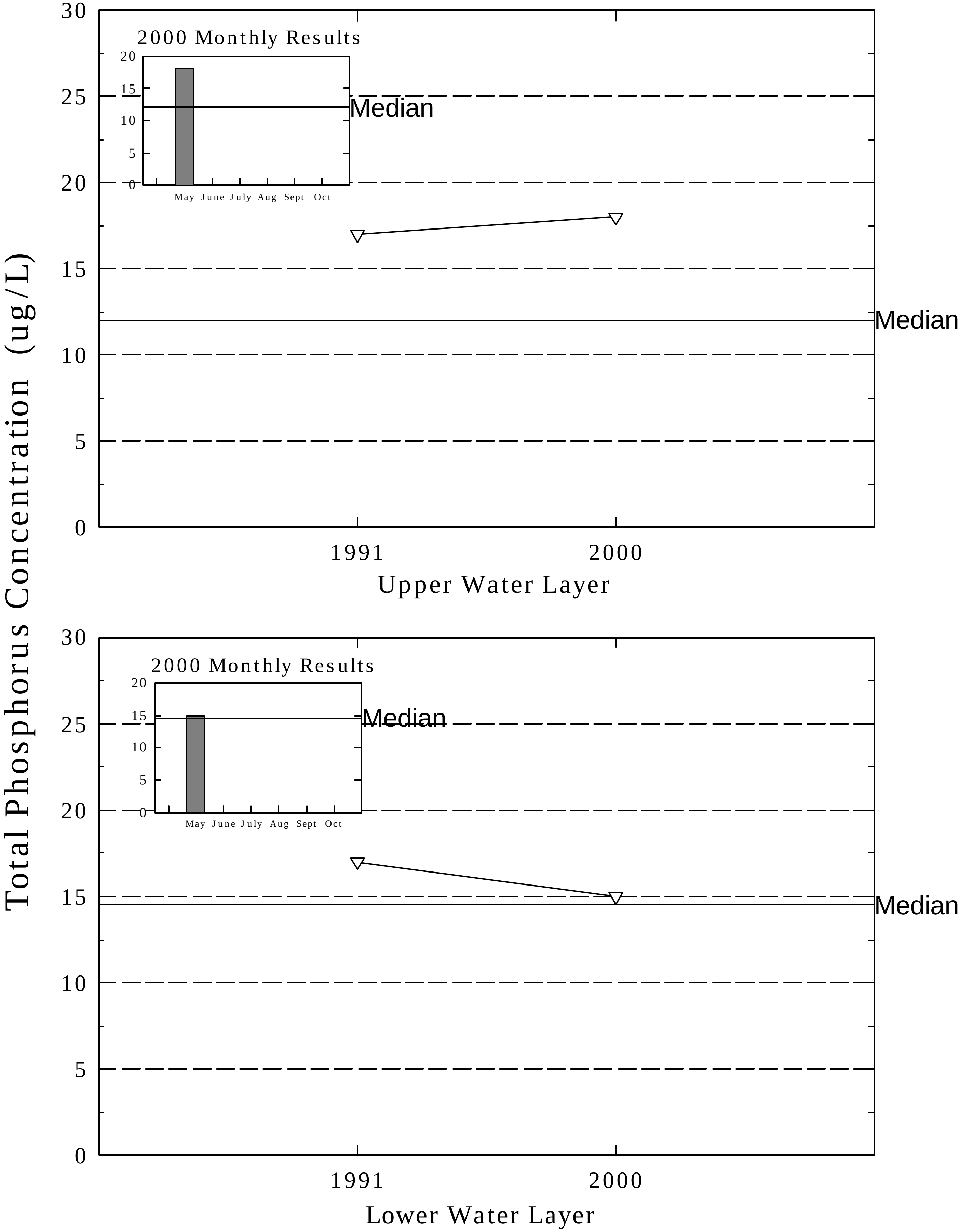


**Table 1.**

**SHELLCAMP POND**

**GILMANTON**

**Chlorophyll-a results ($mg/m^3$) for current year and historical sampling periods.**

| Year | Minimum | Maximum | Mean |
|---|---|---|---|
| 1991 | 3.80 | 3.80 | 3.80 |
| 2000 | 4.93 | 4.93 | 4.93 |

**Table 2.**

**SHELLCAMP POND**

**GILMANTON**

**Phytoplankton species and relative percent abundance.**

**Summary for current and historical sampling seasons.**

| Date of Sample | Species Observed | Relative % Abundance |
|---|---|---|
| 08 / 29 / 1991 | ASTSERIONELLA | 61 |
| | CHRYSOSPHAERELLA | 13 |
| | COELOSPHAERIUM | 6 |
| 05 / 12 / 2000 | ASTERIONELLA | 37 |
| | DINOBRYON | 36 |
| | TABELLARIA | 21 |

**Table 3.**

**SHELLCAMP POND**

**GILMANTON**

**Summary of current and historical Secchi Disk transparency results (in meters).**

| Year | Minimum | Maximum | Mean |
|---|---|---|---|
| 1991 | 1.5 | 1.5 | 1.5 |
| 2000 | 2.5 | 2.5 | 2.5 |

**Table 4.**

**SHELLCAMP POND**

**GILMANTON**

**pH summary for current and historical sampling seasons.**
**Values in units, listed by station and year.**

| Station | Year | Minimum | Maximum | Mean |
|---|---|---|---|---|
| EPILIMNION | | | | |
| | 1991 | 6.60 | 6.60 | 6.60 |
| | 2000 | 6.48 | 6.48 | 6.48 |
| HYPOLIMNION | | | | |
| | 1991 | 6.30 | 6.30 | 6.30 |
| | 2000 | 6.41 | 6.41 | 6.41 |
| INLET | | | | |
| | 2000 | 6.49 | 6.49 | 6.49 |
| OUTLET | | | | |
| | 1991 | 6.60 | 6.60 | 6.60 |

**Table 5.**

**SHELLCAMP POND**

**GILMANTON**

**Summary of current and historical Acid Neutralizing Capacity.**
**Values expressed in mg/L as CaCO .**

**Epilimnetic Values**

| **Year** | **Minimum** | **Maximum** | **Mean** |
|---|---|---|---|
| 1991 | 4.70 | 4.70 | 4.70 |
| 2000 | 4.30 | 4.30 | 4.30 |

**Table 6.**

**SHELLCAMP POND**
**GILMANTON**

**Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.**

| Station | Year | Minimum | Maximum | Mean |
|---|---|---|---|---|
| EPILIMNION | | | | |
| | 1991 | 84.3 | 84.3 | 84.3 |
| | 2000 | 99.8 | 99.8 | 99.8 |
| HYPOLIMNION | | | | |
| | 1991 | 83.6 | 83.6 | 83.6 |
| | 2000 | 99.1 | 99.1 | 99.1 |
| INLET | | | | |
| | 2000 | 261.0 | 261.0 | 261.0 |
| OUTLET | | | | |
| | 1991 | 81.0 | 81.0 | 81.0 |

**Table 8.**

**SHELLCAMP POND**
**GILMANTON**

**Summary historical and current sampling season Total Phosphorus data. Results in ug/L.**

| Station | Year | Minimum | Maximum | Mean |
|---|---|---|---|---|
| EPILIMNION | | | | |
| | 1991 | 17 | 17 | 17 |
| | 2000 | 18 | 18 | 18 |
| HYPOLIMNION | | | | |
| | 1991 | 17 | 17 | 17 |
| | 2000 | 15 | 15 | 15 |
| INLET | | | | |
| | 2000 | 14 | 14 | 14 |
| OUTLET | | | | |
| | 1991 | 11 | 11 | 11 |

**Table 9.**

**SHELLCAMP POND**

**GILMANTON**

**Current year dissolved oxygen and temperature data.**

| Depth (meters) | Temperature (celsius) | Dissolved Oxygen (mg/L) | Saturation (%) |
|---|---|---|---|
| **May 12, 2000** | | | |
| 0.1 | 16.1 | 6.4 | 65.0 |
| 1.0 | 15.1 | 6.4 | 63.0 |
| 2.0 | 14.4 | 6.3 | 61.0 |
| 3.0 | 12.8 | 5.1 | 47.0 |

**Table 10.**

**SHELLCAMP POND**

**GILMANTON**

**Historic Hypolimnetic dissolved oxygen and temperature data.**

| Date | Depth (meters) | Temperature (celsius) | Dissolved Oxygen (mg/L) | Saturation (%) |
|---|---|---|---|---|
| August 24, 1991 | 4.0 | 20.0 | 3.8 | 42.0 |
| May 12, 2000 | 3.0 | 12.8 | 5.1 | 47.0 |

**Table 11.**

**SHELLCAMP POND**

**GILMANTON**

**Summary of current year and historic turbidity sampling.**

**Results in NTU's.**

| Station | Year | Minimum | Maximum | Mean |
|---|---|---|---|---|
| EPILIMNION | | | | |
| | 2000 | 0.5 | 0.5 | 0.5 |
| HYPOLIMNION | | | | |
| | 2000 | 0.6 | 0.6 | 0.6 |
| INLET | | | | |
| | 2000 | 0.8 | 0.8 | 0.8 |

**Table 12.**

**SHELLCAMP POND**

**GILMANTON**

**Summary of current year bacteria sampling.**
**Results in counts per 100ml.**

| Location | Date | E. Coli<br>See Note Below |
|---|---|---|
| BEACH 2 | | |
| | May 12 | 1 |

**NOTE: "<" means "less than" and ">" means "greater than"**